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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/681,522	10/07/2003	Stefan P. Hau-Riege	42P12084D	9661

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EXAMINER	
TSAI, H JEY	

ART UNIT	PAPER NUMBER
2812	

DATE MAILED: 05/04/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	**Application No.** 10/681,522	**Applicant(s)** HAU-RIEGE, STEFAN P.	
	Examiner H.Jey Tsai	**Art Unit** 2812	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *9-16* is/are pending in the application.

4a) Of the above claim(s) *14-16* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *9-13* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *07 October 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *10/7/03*.

4) ☒ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

Election/Restriction

Restriction to one of the following inventions is required under 35 U.S.C. § 121:

This application contains claims directed to the following patentably distinct species of the claimed invention: A first species of method of forming an interconnect. A second species of using a machine-readable medium that provide instruction.

During a telephone conversation with Heather Molleur on April 19, 2004 provisional election was made without traverse to prosecute the invention of first species, claims 9-13. Affirmation of this election must be made by Applicant in responding to this office action. Claims 14-16 are withdrawn from further consideration by the Examiner, 37 C.F.R. § 1.142(b), as being drawn to a non-elected invention.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 9- 10 and 12-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lin 6,307,268, cited by applicant, in view of Shimizu et al. 6,242,808.

The reference(s) teach the features:

Lin substantially discloses a method of forming a semiconductor device, which includes:

forming an inter-layer dielectric 4 and following metalization layer 1 (called interconnect, an aluminum wire) on a substrate, fig. 1+ and col. 5, line 4+,

the metalization layer 1 comprising at least one first interconnect 1,

forming an upper inter-layer dielectric (not shown) and an upper metalization layer 12 over the inter-layer dielectric 4 and the metalization layer 1 (a part of structure 10), the upper metalization layer comprising at least one upper interconnect having a metal plug (not shown) to contact the first interconnect 1, see fig. 3,

providing at least one dummy via plug 11 disposed underneath the at least one first interconnect 1 proximate to the metal plug, see col. 5, lines 11-18, col. 4, lines 41-62,

the at least one dummy via plug 11 provides a reservoir for metal ions to reduce a build-up of electromigration-induced mechanical stress, see abstract, col. 4, lines 16-62, col. 5, lines 19+, col. 2, lines 25-37.

The difference between the reference(s) and the claims are as follows: Lin teaches using a dummy plug to provide a reservoir for metal ions to reduce a build up of electromigration induced stress and an upper metalization layer 12 but does not show an upper inter-layer formed over the inter-layer dielectric layer and a copper metalization layer. However, Shimizu et al. teaches at figure 5 and col. 7, lines 28-48, forming an upper inter-layer dielectric layer 60C over the inter-layer dielectric layer 60B having a copper wiring and conductive plugs 61A-61E.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified Lin's process with an upper dielectric layer formed over the inter-layer dielectric layer and using copper as metalization layer as suggested by Shimizu et al. because an upper dielectric must be formed over the inter-layer dielectric layer so that Lin's metal layer 12 can be formed in the upper dielectric layer and using copper as metalization layer to improve conductivity and increases wiring electromigration resistance so that a large electric current can flow in the wiring layer without thinning and/or breaking up the wire.

Claim 11 is rejected under 35 U.S.C 103 as being unpatentable over Lin in view of Shimizu et al. as applied to claims 9-10 and 12-13 above, and further in view of Wada et al. 5,629,236, cited by applicant.

The difference between the references applied above and the instant claim(s) is: Lin teaches using a dummy plug to provide a reservoir for metal ions to reduce a build up of electromigration induced stress but does not show a dummy plug that is not connected to other wiring. However, Wada teaches at col. 8, lines 37-48, col. 13, lines 48-59 and fig.4D, a dummy plug is not in electrical contact with other interconnects within an integrated circuit for providing a reservoir for metal ions to reduce a build-up of electromigration-induced mechanical stress.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified Lin's process with a dummy plug that is not in electrical contact with other interconnects within an integrated circuit as suggested by Wada et al. because a dummy plug provides a reservoir for metal ions to reduce a build-up of electromigration-induced mechanical stress.

Any inquiry of a general nature or clerical matters or relating to the status of this application or proceeding should be directed to the Group customer service whose telephone number is 571-272-1626 and Fax number (703) 872-9306.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to H. Jey Tsai whose telephone number is (571) 272-1684. The examiner can normally be reached on from 7:00 Am to 4:00 Pm., Monday thru Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Niebling can be reached on (571) 272-1679. The fax phone number for this Group is (703) 872-9306.

hjt
4/20/04

H. Jey Tsai
Primary Examiner
Patent Examining Group 2800